



# From Barcelona to Sea Ice Prediction Network

2014 Sea Ice Prediction Workshop at NCAR, Boulder, Colorado, USA, 1-2 April 2014



## Institut Català de Ciències del Clima (IC3)

Catalan Institute of Climate Sciences, 08005 Barcelona, Spain

- **Climate Forecasting Unit (CFU) led by Francisco J. Doblas-Reyes**

→ Support from the Catalan government, and 2 Spanish and 7 EU FP7 grants

- **Research line on polar climate prediction:**

**Virginie Guemas (lead researcher)**

***Neven S. Fučkar* (research scientist)**

**Danila Volpi, (Ph.D. student)**

**Muhammad Asif (software engineer)**

**Oriol Mula Valls (software engineer)**

Davis Strait  
March 31<sup>st</sup>, 2014



# Plans for Arctic sea ice and climate predictions

➔ **PICA-ICE** project funded by the Spain's MINECO :

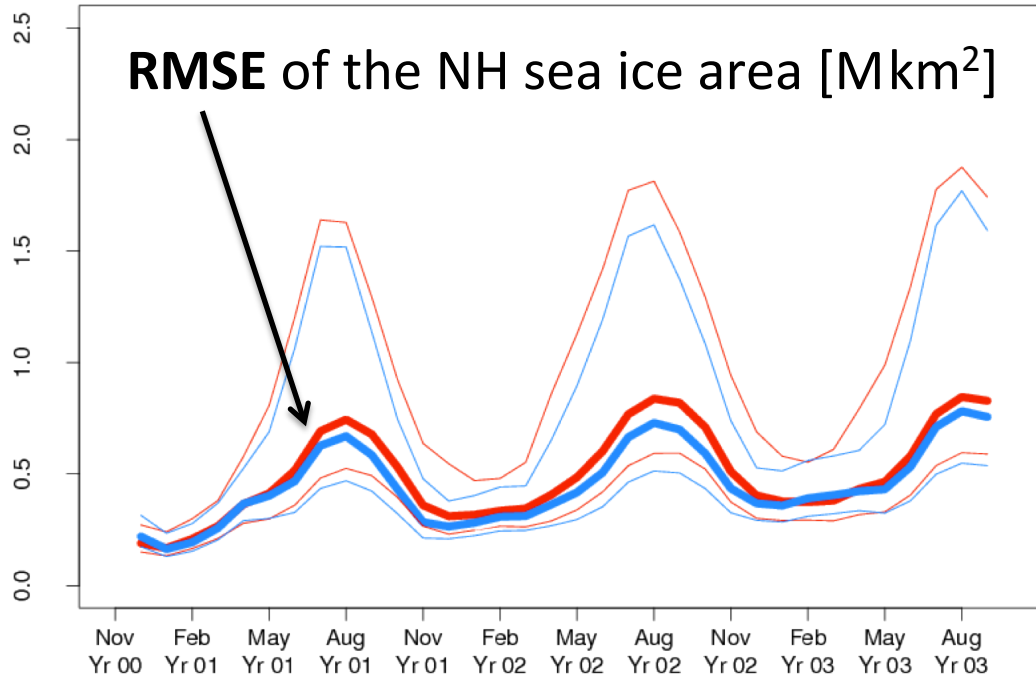
- 1) Production of **ensemble sea ice reconstructions** (nearly operational)  
**HistDfsNudg** 1958-2006, **HistEraNudg** 1979-present → **sea ice IC**
- 2) Study of intraseasonal-to-interannual variability of sea ice cover and its impact on the NH climate with **novel classification methods**
- 3) Assess ability of **EC-Earth** to **forecast the sea ice modes obtained by classification analysis**
- 4) **Extreme sensitivity experiments** - removal of the Arctic and regional sea ice to assess its recovery timescales and the NH climate response

➔ **SPECS** project – WP3.1 funded by European Union (FP7) :

Multi-model assessment of the **benefits of initializing the sea ice state** observationally-constrained IC versus climatological IC

➔ **Ph.D.** by D.Volpi on sea ice anomaly initialization

## RMSE of the NH sea ice area [Mkm<sup>2</sup>]



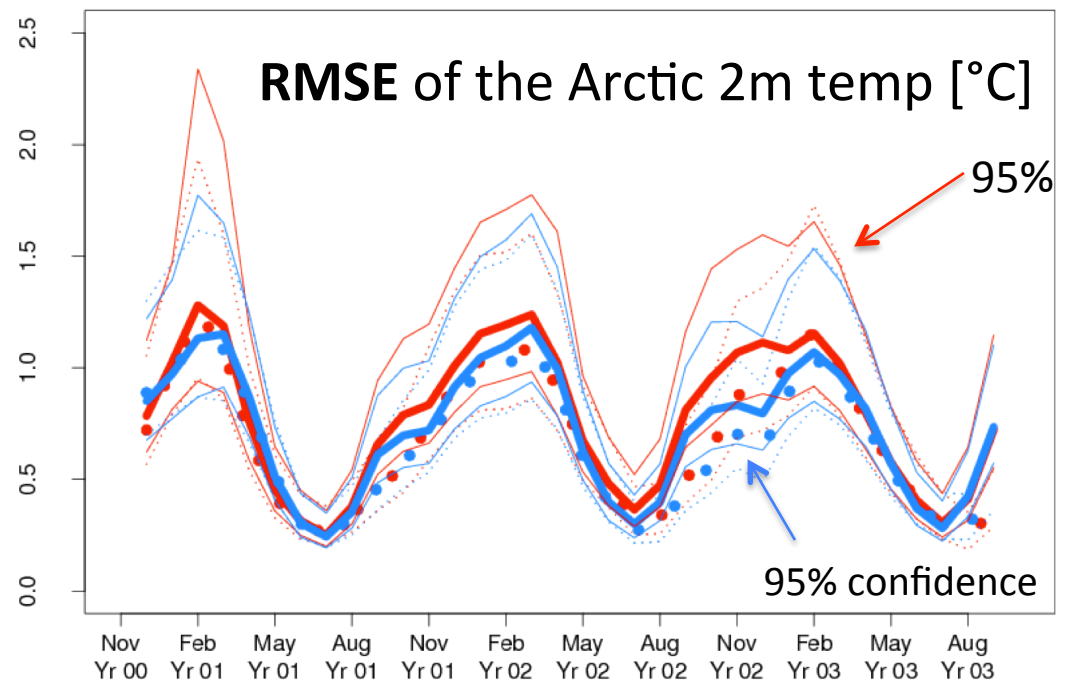
● **EC-Earth2.3 CMIP5 hindcasts**

● **EC-Earth2.3 CMIP5 hindcasts with ensemble sea ice IC from HistDfsNudg (an IC3 product for the PICA-ICE project)**

**HistDfsNudg → 5 members of sea ice IC that are dynamically and thermodynamically consistent with ORAS4 and ERA-40**

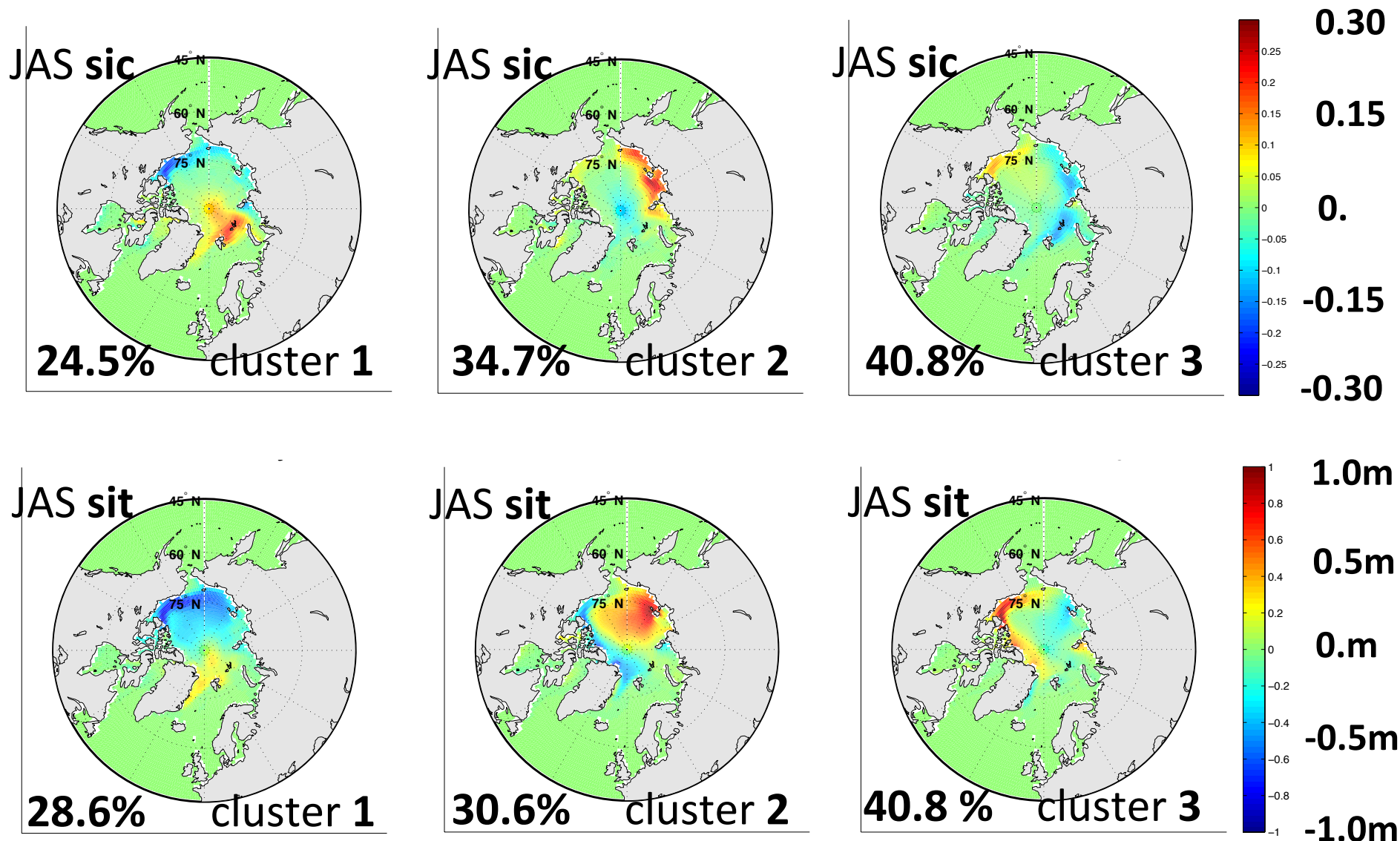
**⇒ Deterministic skills, e.g. both RMSE and ACC (not shown), demonstrate improvements with HistDfsNudg IC with the forecast time**

## RMSE of the Arctic 2m temp [°C]





- **K-means cluster analysis, K=3, of JAS detrended anomalies (1958-2006) of sea ice concentration (sic) and thickness (sit) from HistDfsNudg reconstruction**





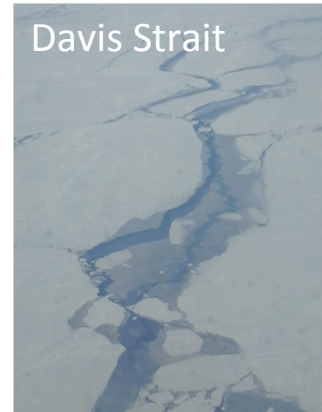


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## Contributions of IC3 to the 2014 SEARCH Sea Ice Outlook:

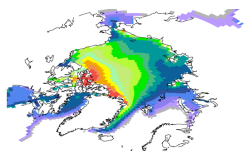
- **EC-Earth2.3** seasonal climate predictions (at least 5 members) initialized from ERA-Interim, ORAS4 and **HistEraNudg** conditions
- Potentially **EC-Earth3.1** predictions under the same conditions (limiting factor: not yet complete IC setup for EC-Earth3.1)

→ PPP workshop on polar-lower latitude linkages, Barcelona, 10-12 December, 2014

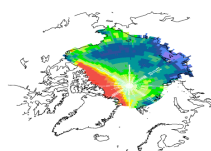


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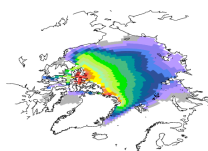
a) February-March HistDfsNudg



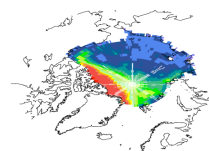
b) February-March IceSat



c) October-November HistDfsNudg



d) October-November IceSat



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